* NOTICES *

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2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] It consists of polymer layer components (B) which contain the protective-layer component (A) and magnetic particle which consist of fiber-forming nature thermoplasticity polymer in 5 - 85% of the weight of the range. In the particle-size-distribution curve to which a magnetic particle is expressed with the weight of the settling particle by the centrifugal settling method Compound magnetism fiber characterized by being the mixture of the particle (D1) in the range the maximum point of whose is 0.1-0.5micro, and the particle (D2) in the range whose maximum points are 0.8-2.0micro, and the ranges of the weight ratio (D1/D2) being 10 / 90 - 90/10.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention prevents condensation of materials for health promotion, such as healthy material adapting the MAG, bedding, and a mat, the filter material for magnetic powder recovery, or ink, is suitable as a material for felt-tipped marker cotton pads which makes the dispersibility of ink hold good, and relates to compound magnetism fiber excellent in handling nature.
[0002]
[Description of the Prior Art] As organic fiber which scoured the magnetic particle, a magnetic particle is conventionally mixed to the thermoplastic polymer which has stringiness, and the method of being mixed to the spinning undiluted solution in the method, dry spinning, or wet spinning which performs and carries out fibrosis of the melting blend spinning in the shape of a slurry, carrying out the silk manufacture of the magnetic particle to it, and carrying out fibrosis to it etc. is proposed (JP,55-98909,A, JP,54-158007,U, JP,64-482,B).
[0003] However, since these magnetic fiber is single fibers which mixed the magnetic particle in the fiber-forming nature polymer, the magnetic particle is exposed to convex on the fiber front face, and it is extremely inferior in smooth nature.
[0004] The bicomponent fiber with which the protective layer which consists of a magnetic layer which consists of polymer containing a magnetic particle as what improves this fault, and fiber-forming nature polymer is compounded is proposed (JP,57-167416,A). However, while spinning nature and ductility will get worse if it is made such although it is necessary to make [many] a magnetic layer ratio after making fairly abundant the content of the magnetic particle in a magnetic layer in order to make coercive force become size in this bicomponent fiber, in various processes, it has the fault that a magnetic layer will be exposed to a fiber front face. Moreover, there is a dynamic performance of the obtained bicomponent fiber also with a bird clapper low.
[0005]
[Problem(s) to be Solved by the Invention] The purpose of this invention is to offer the compound magnetism fiber which fully demonstrates magnetic properties, after degradation of various process nature, such as the fault which the above-mentioned conventional technology has, i.e., the split-face state on the front face of fiber, spinning, and extension, and the dynamic property of fiber is canceled.
[0006]
[Means for Solving the Problem] According to this invention, the above-mentioned purpose consists of polymer layer components (B) which contain the protective-layer component (A) and magnetic particle which consist of fiber-forming nature thermoplasticity polymer in 5 - 85% of the weight of the range. In the particle-size-distribution curve to which a magnetic particle is expressed with the weight of the settling particle by the centrifugal settling method It is the mixture of the particle (D1) in the range the maximum point of whose is 0.1-0.5micro, and the particle (D2) in the range whose maximum points are 0.8-2.0micro. It is attained by offering the compound magnetism fiber characterized by the ranges of the weight ratio (D1/D2) being 10 / 90 - 90/10.
[0007] It will not be limited, especially if it is the matter tinctured with magnetism by magnetization as a magnetic particle in this invention and is the matter used as the factor which worsens melt spinning nature. Specifically, metals, such as iron, nickel, and cobalt, the alloys which make these a component, these oxides, a ferrite, etc. are mentioned. Especially, ferrite compounds, such as intermetallic compounds, such as the samarium cobalt magnetic substance, and a strontium ferrite, have desirable coercive force from a large thing.
[0008] In the particle-size-distribution curve to which a magnetic particle is expressed with the weight of the settling particle by the centrifugal settling method The range the maximum point of whose is 0.1-0.5micro, the particle which is in the range of 0.2-0.4micro preferably (D1), And it is the mixture of the range whose maximum points are 0.8-2.0micro, and the particle (D2) which is in the range of 1.0-1.8micro preferably, and the weight ratio of D1 and D2 needs the range of 10 / 90 - 90/10, and to be the range of 20 / 80 - 80/20 preferably. High concentration addition of a magnetic particle is enabled in a particle D1, a high MAG performance is given, and fiber with a magnetic, more high performance is obtained according to the synergistic effect of both of raising the flux density per unit volume in a particle D2. In the polymer by which the maximum point of a particle-size-distribution curve contains the magnetic particle which separates from the range specified by this invention, the dispersibility of a particle becomes bad, and thread breakage and single fiber pieces occur frequently in a spinning process or an

extension process, and the purpose of this invention cannot be attained. It becomes inadequate [when the mixed weight ratio of a particle D1 and a particle D2 is furthermore less than 10/90, the formation of a high MAG performance by the particle D1 is inadequate, and], when the mixed weight ratio of a particle D1 and a particle D2 exceeds 90/10 high-flux-density-izing according to a particle D2.

[0009] the content of the magnetic particle in a polymer layer component (B) -- 5 - 85% of the weight of the range -- it is 10 - 70% of the weight of a range preferably If a magnetic performance is inadequate and 85 % of the weight is exceeded when a content is less than 5 % of the weight, a magnetic performance is not only reaching the ceiling, but a problem will arise to process nature, such as spinning nature.

[0010] Even if it contains a lot of magnetic particles as polymer which constitutes a polymer layer component (B), it is desirable that each process nature, such as a fluidity, spinning nature, and ductility, is good. The hydrogenation object of a block copolymer which specifically consists of an aromatic vinyl block unit and conjugated-diene block units, such as a hydrogenation object of the block copolymer (SBS) of nylon 6, nylon -66, nylon 6, 10, Nylon 12, Nylon 11, nylon -4, nylon -4, the polyamide system polymer that makes 6 grades a principal component, and styrene-styrene butadiene rubber, a hydrogenation object of the block copolymer (SIS) of styrene-isoprene-styrene, and a hydrogenation object of the block copolymer of an alpha-methyl-styrene-isoprene-alpha methyl styrene,

[0011] As a method of carrying out distributed addition of the magnetic particle uniformly into the polymer which constitutes a polymer layer component (B), various methods are possible. For example, kneading fabrication of the above-mentioned polymer and the magnetic particle is carried out with a 2 shaft kneading extruder etc., a high-concentration masterbatch is manufactured, and there is the method of diluting with the above-mentioned polymer so that it may become predetermined concentration at the time of spinning. In kneading the polymer and the magnetic particle which constitute a polymer layer component (B), if various distributed assistants are added, the dispersibility of a magnetic particle will become good. Moreover, various kinds of antioxidants, a stabilizer, lubricant, an optical bleaching agent, a coloring agent, a pigment, etc. can be made to contain if needed.

[0012] As polymer which constitutes a protective-layer component (A), although polyolefines, such as polyester, such as nylon 6, nylon -66, nylon 6, 10, Nylon 12, Nylon 11, nylon -4, nylon -4, a polyamide of 6 grades, polyethylene terephthalate, a polybutylene terephthalate, and polyhexamethylene terephthalate, polyethylene, and polypropylene, etc. are mentioned, polyester system polymer and polyamide system polymer are desirable on the practicality ability as fiber. Especially, polyester system polymer is more desirable on spinning nature, processability, and a fiber dynamic property. As polyester system polymer, a terephthalic acid, an isophthalic acid, naphthalene -2, 6-dicarboxylic acid, Aliphatic dicarboxylic acids, such as aromatic dicarboxylic acids, such as a phthalic acid, 4, 4'-dicarboxy diphenyl one, and 5-sodium sulfoisophtharate, an adipic acid, an azelaic acid, and a sebacic acid, or these ester Ethylene glycol, a diethylene glycol, 1, 4-butanediol, 1, 6-hexandiol, 1, 8-octanediol, 1, 9-nonane diol, Neopentyl glycol, a cyclohexane -1, 4-dimethanol, The alkylene oxide addition product of bisphenol A, a polyethylene glycol, The polyester of the fiber-forming nature compounded from hydroxy acids, such as diols, such as a polytetramethylene glycol, and a p-oxy-benzoic acid, etc. can be used. Especially, more than 80 mol % of a composition unit and the polyester more than whose 90 mol % is an ethylene terephthalate unit or a butylene terephthalate unit are the most desirable, and copolymerization of the little third component may be carried out to this polyester. The above-mentioned polymer can be made to contain various kinds of antioxidants, a stabilizer, lubricant, an optical bleaching agent, a coloring agent, a pigment, etc. if needed.

[0013] Although compound spinning of the bicomponent fiber of this invention is carried out of the polymer layer component (B) and protective-layer component (A) containing a magnetic particle, as a cross-section (fiber cross section) configuration which intersected perpendicularly with the fiber axis of this fiber, a configuration in which a protective-layer component (A) occupies 60% or more of a fiber surface circumference is desirable. Since the rate which a polymer layer component (B) exposes to a fiber front face increases, wear of a guide, a roller, etc. becomes intense in post processing at the time of the fiber-ized process at the time of silk manufacture, and weaving and troubles, such as thread breakage, occur further when the fiber surface circumference which a protective-layer component (A) occupies is less than 60%, it is not desirable.

[0014] Although a thing various in the compound form of a protective-layer component (A) and a polymer layer component (B) is mentioned, drawing 1 - drawing 8 are mentioned as a typical compound form. For the 3 hearts and drawing 3 , the sheath-core structure fiber cross section of the 4 hearts and drawing 4 are [drawing 1 / the 1 heart and drawing 2 / the sheath-core structure fiber cross section, drawing 7 and drawing 8 of an open flume type of a part of three-layer concentric circle, drawing 5 , and drawing 6] assembled-die composite-construction fiber cross sections. In the fiber which has the fiber cross-section structure shown by drawing 7 and drawing 8 depending on the combination of a protective-layer component (A) and a polymer layer component (B), the fiber which has the fiber cross-section structure which exfoliation by the interface between components may arise, and is shown by drawing 5 and drawing 6 may cause wear of the guide in a fiber-ized process and post processing, a roller, etc.

[0015] The cross-section configuration (drawing 1 - drawing 4) by which the heart is completely covered with the sheath from the point which wear and the thread breakage of a guide, a roller, etc. are prevented, and can prevent exfoliation by the interface between components is desirable.

[0016] As for the compound ratio (weight ratio) of a protective-layer component (A) and a polymer layer component (B), 15 / 85 - 85/15 are desirable, and 20 / 80 - 80/20 are more desirable. Since the bicomponent-fiber intensity obtained falls when the compound ratio of a protective-layer component (A) is less than 15 % of the weight, it is not desirable. On the other hand, since the magnetic effect which is the original purpose by the polymer layer component (B) stops being discovered enough when the

compound ratio of a protective-layer component (A) exceeds 85 % of the weight, it is not desirable.
[0017] the fiber of this invention -- a protective-layer component (A) and a polymer layer component (B) -- a separate melting system -- heating fusion -- carrying out -- respectively usual extrusion spinning equipment -- a spinneret -- conveying -- spinning -- a hole -- once making both components join according to a desired compound configuration in front, carrying out spinning, and rolling round or storing spinning raw thread in KENSU, it is obtained by extending and heat-treating It rolls round after spinning at the method and high speed which are extended directly, and the method of using as a final product as it is is also used. You may have the polygon of three to 8 leaf shape, T form, etc., or other variant cross-section configurations by using a variant cross-section nozzle at the time of spinning. Furthermore post processing, such as a crimp and false-twist processing, can be performed, and even if it becomes the configuration which was similar to polygons, such as five angles and a hexagon head, with this high order processing, it does not interfere.
[0018] The bicomponent fiber of this invention is in the state which does not carry out a crimp by the cut shape of a continuous filament or a staple almost like usual fiber, or the state which carried out the crimp, and can be manufactured in thread, textiles, knitting, a nonwoven fabric, a paper leather state object, and other fiber structure objects. When using with other fiber together, every means of the volume interweaving, doubling, doubling and twisting, union, and on intersection and others can be used. And a fiber structure object can perform processing processing of dyeing, resin treatment, etc. if needed, and can present various kinds of uses with it. Dyeing is [0019] which can be performed with each form of fiber, thread, and a fiber structure object. The method which may use what well-known method as a method of magnetizing in the bicomponent fiber of this invention, its aggregate, or the fiber structure object using it, for example, is held all over a magnetic field in the state of fiber or the aggregate, the method of holding a fiber structure object all over a magnetic field, etc. are mentioned. In addition, magnetizing at the time of spinning is also possible, and demagnetization and magnetization can also be combined.
[0020]
[Example] Hereafter, although an example explains this invention in detail, this invention is not limited to these examples at all. In addition, the maximum point in the particle-size-distribution curve of the magnetic particle in an example computed the sample which made water distribute the magnetic particle before adding to polymer based on the centrifugation curve which measured by the centrifugal settling method and was obtained using the particle-size-distribution measuring device (CAPA-500, Horiba, Ltd. make). That is, it asked from the particle-size-distribution curve which expressed particle size and the settling-particle weight based on this centrifugation curve. Moreover, the intensity of fiber and ductility are JIS. L It measured and asked based on 1013.
[0021] The nylon 6 (F-70, Idemitsu Petrochemical company make) with which the particle D1 which has the example 1 maximum point in 0.3micro, the particle D2 which has the maximum point in 1.5micro, and the particle D1-/particle D2 (weight ratio) contain the strontium ferrite which has 60/40 of particle size distributions 70% of the weight In the temperature of 260 degrees C, kneading extrusion was carried out with the 2 shaft kneading machine, and the extruded strand was cut and it considered as the pellet [a polymer layer component (B)]. On the other hand, the polyethylene terephthalate of [limiting viscosity eta] =0.68 is used as a protective-layer component (A). The melting knockout of a protective-layer component (A) and the polymer component (B) is supplied and carried out to a separate extruder. while a protective-layer component (A) carries out constant-rate measurement, respectively so that a sheath and a polymer component (B) may serve as the heart (drawing 1 : compound ratio A/B= 4/1) -- a nozzle -- the mouthpiece was supplied and it rolled round by part for 1500m/in speed after spinning at the temperature of 300 degrees C
[0022] After preheating the obtained spinning raw thread with a heating roller with a temperature of 80 degrees C, it extended to 2.5 times as many draw magnification as this, the heat set was performed by the hot platen subsequently to the temperature of 140 degrees C heated, and the multifilament of 120-denier 24 filaments was obtained. The intensity of this extension thread was 3.7g/denier, and ductility was 33.4%.
[0023] Using this extension thread, it passed, the plain weave fabric was produced by 75 densities/inch and the fablic density of 50 ******/inch, and refinement finishing was performed. Both spinning nature, ductility, textile production process nature, etc. were good. thus, knitting and the plain weave fabric which carried out the round braid of the obtained extension thread -- 20,000 -- among the magnetic field of Oe(s) (oersted), at 220 degrees C, it heated for 20 minutes and cooled Knitting and a plain weave fabric have permanent magnet nature, and showed adsorptivity strong against iron.
[0024] Subsequently this extension thread was lengthened and arranged and it considered as the 100,000-denier tow, multifilament extension thread was obtained like example 2 example 1, after the crimp machine gave the crimp, it cut, and the staple fiber was obtained. This staple fiber was made into Webb through the card, the laminating of obtained Webb was carried out, needle punching was performed, subsequently it heat-treated in oven with a temperature of 250 degrees C, and the nonwoven fabric of superintendent officer 200 g/m**2 was obtained. The form maintenance nature of a nonwoven fabric was good.
[0025] this nonwoven fabric -- 10,000 -- when magnetized [be / under / magnetic field / of Oe(s) (oersted)] letting it pass / it], this nonwoven fabric showed strong permanent magnet nature When with a particle size [0.3-10micro] iron powder was sprinkled uniformly, the wind was applied on this nonwoven fabric and the adsorption situation of iron powder was observed, iron powder was adsorbed to a nonwoven fabric almost strongly.
[0026] In example 3 example 1, except using the hydrogenation object (SEPUTON KL2002, Kuraray Make) of SIS instead of nylon 6, it magnetized similarly by having produced the volume kneading, spinning, extension, weaving, and on cylinder, and the nonwoven fabric, and the magnetic performance evaluation was performed. Textiles, knitting, and a nonwoven fabric have strong permanent magnet nature, and showed adsorptivity strong against all with a particle size [0.3-10micro] iron powder.
[0027] In one to example of comparison 3 example 1, it replaced with the strontium ferrite, and except only the strontium ferrite

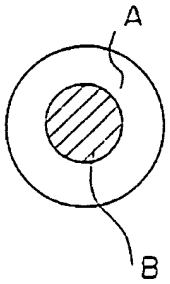
to which only the strontium ferrite to which only the strontium ferrite which has the maximum point in 1.1micro has (the example 1 of comparison) and the maximum point in 0.3micro has (the example 2 of comparison) and the maximum point in 1.5micro using (the example 3 of comparison), similarly, it magnetized by having produced the volume kneading, spinning, extension, weaving, and on cylinder, and As compared with the textiles obtained in the examples 1-3, knitting, and the nonwoven fabric, permanent magnet nature was low, and when a part of iron powder sprinkled on the nonwoven fabric hit a wind, dispersing was observed.

[0028]

[Effect of the Invention] In the magnetic performance's being very excellent by carrying out compound spinning of the polymer layer component which contains so much the magnetic particle which has specific particle size distribution, and the protective-layer component which consists of fiber-forming nature thermoplasticity polymer, magnetic fiber excellent also in spinning nature and the fiber dynamics property is obtained.

[Translation done.]

Drawing selection [Representative drawing]



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